REMARKS

I. Status of the Claims

Claims 1-18 are pending in this application and remain for consideration.

II. Response to the Section 103(a) Rejection over Grey in view of Schindler

Applicants traverse the rejection of claims 1-18 under 35 U.S.C. § 103(a) as unpatentable over Grey (U.S. Pat. No. 6,441,204) in view of Schindler et al. (U.S. Pat. No. 6,916,756), and they respectfully ask the Examiner to reconsider and withdraw the rejection in view of the following remarks.

"A proper analysis under § 103 requires, inter alia, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success" (emphasis added). *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991). The cited patents neither suggest Applicants' claimed invention, nor would give one of ordinary skill a reasonable expectation that the claimed process would be successful.

Applicants claim a method of regenerating a used noble metal-containing titanium zeolite catalyst that was used to catalyze the epoxidation of an olefin with hydrogen and oxygen in the presence of at least one reaction solvent and at least one buffer. The regeneration method comprises the steps of: (a) heating the used catalyst at a temperature of at least 250°C in the presence of a gas stream comprised of oxygen to obtain a heated product; and (b) reducing the heated product at a temperature of at least 20°C in the presence of a gas stream comprised of hydrogen to form a reactivated catalyst.

Grey discloses a liquid phase process for epoxidizing an olefin with hydrogen and oxygen in the presence of a catalyst mixture comprising a titanium zeolite and a supported catalyst comprising palladium on niobium-containing support, and with the optional presence of a buffer. Although Grey discloses a liquid phase epoxidation process similar to Applicants' epoxidation process, Grey does not disclose nor does

Grey suggest Applicants' regeneration process. In fact, Grey does not teach that its disclosed catalyst mixture even deactivates or requires regeneration. In addition, Grey does not teach the "noble metal-containing titanium zeolite catalysts" required by Applicants' current invention. Rather, Grey teaches a catalyst mixture that comprises two separate components: (a) a titanium zeolite; and (2) a palladium on niobium-containing support (e.g., Pd/Nb_2O_5). In contrast, Applicants require the use of a noble metal-containing titanium zeolite catalyst in which the noble metal is incorporated into the zeolite by impregnation, ion exchange, or the like (see current application at page 4, l. 16-21).

In sum, Grey teaches does not teach Applicants' required "noble metal-containing titanium zeolite catalysts," but rather teaches a catalyst mixture. Most importantly, Grey does not even disclose that its catalyst mixtures require regeneration, let alone that the noble metal-containing titanium zeolite catalysts of the present invention would require regeneration. Although Grey teaches that its supported palladium component "may be optionally thermally treated in a gas such as nitrogen, helium, vacuum, hydrogen, oxygen, air, or the like" at a temperature from about 50-550°C, this description relates to the preparation of the supported palladium component and not to its regeneration.

Examiner also cites Schindler. However, Schindler discloses a process for regenerating a dehydrogenation catalyst, not an epoxidation catalyst. The regeneration process of Schindler comprises (a) flushing with inert gas; (b) passing an oxygen-containing gas mixture; (c) optionally passing an oxygen-containing gas mixture at a different pressure and gas hourly velocity than step (b); (d) optionally changing the pressure repeatedly, rapidly and in opposite directions; (e) flushing with an inert gas; (f) activating the catalyst by means of hydrogen; where at least one of the steps (c) or (d) is carried out and the entire regeneration process is carried out at from 300 to 800°C.

The dehydrogenation catalyst of Schindler comprises one or more group VIII transition metals (preferably Pt or Pd) on a support. The support is "a metal oxide selected from the group consisting of zirconium dioxide, zinc oxide, aluminum oxide, silicon dioxide, titanium dioxide, magnesium oxide, lanthanum oxide, cerium oxide and

mixtures thereof as support. Preferred supports are zirconium dioxide and/or silicon dioxide; particular preference is given to mixtures of zirconium dioxide and silicon dioxide." (Col. 4, l. 3-9) Unlike Applicants' required "noble metal-containing titanium zeolite catalysts", Schindler does not disclose that the support is a zeolite. Rather, Schindler only discloses amorphous (i.e., non-zeolite) metal oxides. For instance, the mixed oxides taught of Schindler are prepared by simply mixing silica and zirconia (see Col. 4, l. 41-62). Schindler does not teach that its supports are zeolites produced by the typical process of reacting a titanium compound, a silicon source, and a templating agent at a temperature and for a time sufficient to form a molecular sieve. Thus, Schindler at best only teaches the supported noble metal component of Grey without the titanium zeolite component.

In fact, Schindler would not suggest to one of ordinary skill in the art that they should make Applicants' claimed process using a palladium containing zeolitic catalyst. While the non-zeolitic catalysts of Schindler and the zeolitic catalysts of the present invention both contain palladium, they are not, and indeed cannot, be considered equivalent or even interchangeable. Specifically, zeolite catalysts typically work well in epoxidation reactions with hydrogen peroxide as the oxidizing agent (as currently formed in situ by the reaction of hydrogen and oxygen). In contrast, non-zeolitic catalysts typically work poorly, or not at all, in epoxidation reactions using hydrogen peroxide. For instance, titanium silicalites such as TS-1 which are titanium containing zeolitic catalysts are useful in the epoxidation of olefins with hydrogen peroxide, whereas non-zeolitic titania-on-silica catalysts are useful in the epoxidation of olefins with organic hydroperoxides (such as t-butyl hydroperoxide) and not with hydrogen peroxide. See, for example, U.S. Pat. No. 4,833,260, Neri et al., and U.S. Pat. No. 4,367,342, Wulff et al. Therefore, Schindler would not suggest to one of ordinary skill in the art to use a non-zeolitic catalyst in place of a zeolitic catalyst in an epoxidation reaction using hydrogen peroxide.

Thus, at best, Schindler discloses a regeneration process for a dehydrogenation catalyst that comprises Pt (or Pd) on a mixture of titanium dioxide and silicon dioxide. Schindler does not disclose a noble metal-containing titanium zeolite catalyst, nor an epoxidation process.

The § 103 analysis thus fails under both factors described above. First, Grey and Schindler would not suggest to one of ordinary skill in the art that they should make Applicant's claimed regeneration process for a noble metal-containing titanium zeolite catalyst that was used to catalyze the epoxidation of an olefin with hydrogen and oxygen in the presence of at least one reaction solvent and at least one buffer. Grey does not suggest that Applicants' required catalyst, but rather teaches catalyst mixtures. Grey does not even disclose that its catalyst mixtures even deactivate or require regeneration, nor does Grey teach any regeneration process. Thus, there is nothing to suggest to one of ordinary skill in the art that they should combine the regeneration process of Schindler (for a dehydrogenation catalyst that is different than Applicants' required zeolitic-based catalyst) with the epoxidation process of Grey.

The § 103 analysis also fails the second factor described above. Schindler does not reveal a reasonable expectation of success for regenerating a used zeolitic-based titanium zeolite catalyst that was used in the epoxidation of olefins with hydrogen and oxygen.

In sum, a combination of either Grey and Schindler does not suggest, nor give one a reasonable expectation of success for using, Applicant's claimed regneration process.

In view of the foregoing, Applicants respectfully ask the Examiner to reconsider and withdraw the rejections and pass the case to issue. Applicants invite the Examiner to telephone their attorney at (610) 359-3480 if he believes that a discussion of the application might be helpful.

Respectfully submitted,

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November 23, 2005
CUSTOMER NUMBER 24114

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail, with sufficient postage, in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on November 23, 2005.

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Name of person signing

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